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The Franklin Institute; Its Services and Deserts

By DR. PERSIFOR FRAZER

Professor of Chemistry of the Franklin Institute 1881-94

THE FRANKLIN INSTITUTE
PHILADELPHIA
1908

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The Franklin Institute; Its Services and Deserts.*

BY DR. PERSIFOR FRAZER.

Professor of Chemistry of the Franklin Institute 1881-94.

LADIES AND GENTLEMEN:—

The subject is difficult to treat in a worthy manner, because it has been treated at the fiftieth, the seventieth, and the seventy-fifth anniversaries of the Franklin Institute's birth by the Hon. Frederick Fraley, Dr. Coleman Sellers, Prof. Thurston, our Secretary, Dr. Wm. H. Wahl, and others; and because in these days lectures which are not filled with pictures (moving if possible) or experiments, to charm the eye, no longer satisfy the jaded public. The picture which this lecture is intended to present in its entirety is, however, a moving one in a spiritual sense; and I

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*A lecture delivered before the Franklin Institute, on the occasion of the reception held Friday evening, February 14th, 1908, to formally inaugurate its reorganization following its receipt of the Benjamin Franklin Legacy.

[illegible]

Benjamin Franklin. Duplessis painting

[illegible] glass slipper of Benjamin Franklin [illegible] which that possession con[illegible] to be changed to a gilded [illegible] diamonds; and the shabby [illegible] the good people of a city which, [illegible] rapidly losing prestige in all the di[illegible] used to be peerless, will give its beneficent in[illegible] a part of the help it deserves.

[illegible] began at a beginning which I have not seen referred to in numerous sketches and histories of the Institute, I must believe, in the absence of contradictory information, that the reason for naming this Institute the FRANKLIN Institute was that its work [illegible] planned to realize the projects supported during the whole of his busy life by that greatest of Americans, and so naively expressed in his incomparable will.* Here is the reproduction of the Duplessis painting of Benjamin Franklin. It may almost be said that the blessings we owe to his brain are as numerous and varied as the physical blessings we owe to the Sun: In his splendid invocation to the center of our system Tyndall says * * * *(XIIth Lecture on "Heat as a Mode of Motion," delivered in 1862.)* (The Sun.) " * * * is the source of all animal life and power. * * * Leaving out of account the eruptions of volcanoes and the ebb and flow of the tides, every mechanical action on the earth's surface, every manifestation of power, organic or inorganic, vital and physical, is produced by the Sun."

So with Franklin, whether we regard our educational inheritance in the University of Pennsylvania and the "Philadelphia publick library;" our charitable institutions, such as the Pennsylvania Hospital, and the loans to artisans; our physical defences in the militia system; or our higher associations for the diffusion of knowledge like the American Philosophical Society, we find all originated in the mind of this many-sided man.

The codicil to this will has been many times printed, and sometimes read, but it is so interesting that a few minutes may be profitably spent in referring to it. In language touchingly simple Franklin says: In a democratic state there should be no offices of profit; he gives his salary as President (Governor) to schools, churches, &c., and bequeaths £2000 to make the Schuylkill a navigable stream, but subsequently learning that this sum of £2000 would do little to effect this work, he revokes the bequest. He considers good apprentices most likely to make good citizens; and having, when himself a printer, been favored by two friends with loans, to which he ascribes his fortune and all that he has been able to accomplish, he gives £1000 to the city corporation, to be let out at interest at 5 per cent. per annum to such married artificers under the age of twenty-five years as have served an apprenticeship in the town, faithfully fulfilled the duties demanded by their indentures, and

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*Dr. Coleman Sellers in his address as President of the Franklin Institute, closing its great exhibition of 1874, says: "Franklin, in memory of whose usefulness this Institute was named" * * * .

are guaranteed by two citizens as sureties in a bond with the applicants for repayment with interest of the money lent. These loans are intended to assist young men setting up their business. No one loan is to be more than £60 nor less than £15. Every year 1/10 of the principal shall be paid with interest. The managers are to take care of the business gratis, and the fund is to grow. He estimates it at £131,000 in one hundred years, of which £100,000 shall be laid out in public works, paving, building, etc., and for *bringing the water of the Wissahickon into the town to supply the inhabitants.* The remaining £31,000 is to be again let out at interest for another hundred years, when it ought to amount to £4,061,000, of which £1,061,000 is left to the disposition of the inhabitants of Philadelphia and £3,000,000 to the State of Pennsylvania.

The common thought which appears in Franklin's codicil and this Institute's constitution is the care for the young artificer, or mechanic.

HISTORY.

For some time before the founding of the Franklin Institute, in 1824, there had been numerous movements on foot to educate the working classes under the general designation of Mechanics' Institutes. Of this number was the Andersonian Institution of Glasgow.

An association of mechanics existed in Philadelphia in the late 'teens and early twenties of the last century, and the failure of our founder, Samuel V. Merrick, to be elected to this body is the cause of our present existence. The story is interestingly told by the late Hon. Frederick Fraley in his address at the semi-centennial ceremonies in 1874. After two false starts, Prof. Wm. H. Keating, of the University of Pennsylvania, and Mr. Samuel V. Merrick, with Dr. Robert E. Griffith and Geo. W. Smith, sent notices to some 1200 or 1600 citizens to meet at the County Court House, 6th and Chestnut Streets.

The meeting was largely attended. Mr. James Ronaldson, a Scot, who as a capitalist had founded a bakery, invested in cotton plantations, and was subsequently the owner of the largest type foundry in the United States, was called to the chair.

A committee was appointed to name officers and managers, and when the election was held the roll contained 400 to 500 members.

The first charter of the Franklin Institute of March 30th, 1824, enacts:

Sec. 1. "The Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts" is incorporated with a proviso that the yearly income of the real estate held by them shall not exceed $2000.

William Hypolitus Keating

Dr. William Hypolitus Keating was born in Wilmington, Del., August 11, 1799, and died in London, 1840. His ancestors had emigrated from Ireland to France to escape religious persecution and were ennobled by Louis XVI. His father, Baron John Keating, was a Colonel in the French army, stationed in the West Indies at the outbreak of the Revolution, when he resigned and settled in Wilmington, Del. William H. Keating graduated from the University of Pennsylvania in 1816, and studied in the polytechnic and mining schools of France and Switzerland. Returning to Philadelphia he was elected to the chair of Chemistry and Mineralogy in the University of Pennsylvania. He was geologist and historiographer of Maj. Stephen H. Long's second expedition, in 1723, to discover the source of the Mississippi. He afterwards read law and was sent to England to negotiate the first mortgage loan of the Reading Railway.

Sec. 2. The objects of the said corporation shall be the promotion and encouragement of manufactures, and the mechanic and useful arts, *by the establishment of popular lectures on the Sciences connected with them*,* by the formation of a cabinet of models and minerals, and a library, by offering premiums on all objects deemed worthy of encouragement, and examining all new inventions submitted to them, and by such other measures as they may judge expedient.

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*Italics the author's.

From the very first the supreme aim of the Institute was the instruction of artisans.

In the annual report of the Managers for 1838 it is said the manufactures of Philadelphia were infantile in 1824, when the Institute was founded, and exhibitions were then of great importance, but in 1838 the Arts had improved so vastly over the whole country that these exhibitions were no longer so necessary. It adds: "from earliest days the Franklin Institute contemplated establishing a school of Arts where the mechanic, miner, and civil engineer could receive instruction in all the sciences bearing on their several pursuits." Prof. Walter R. Johnson, the Principal of the High School of the Franklin Institute, published an able essay in the *Journal* of 1828 (p. 353) on the "combination of a practical and liberal course of education." Dr. John K. Mitchell in 1834 gave a thoughtful lecture on "the means of educating the character of the masses."

The Board of Managers again in 1841 in its annual report declares "the great department of the Institute is instruction."*

Under the heading "Regulations for the government of the committee on instruction," it is provided that the lectures shall begin the second Monday in November, and be continued on Monday, Wednesday, and Friday for twenty-one weeks, including the introductory lectures. The first week was to be occupied with introductory lectures, and was open to any who might please to attend, but to the remainder only those were admitted who had tickets; except strangers visiting the city, who might be admitted by a ticket from a member of the Committee on Instruction, or by consent of the Actuary. Tickets of admission were issued to every life-member; to ordinary members who paid their annual dues; to minors who were sons, daughters, wards, or apprentices of the last class on payment of $1; and to pupils of the Drawing School without charge. Gentlemen not members paid $5 and ladies $2 each season.

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*Yet it was possible for the American Academy of Social and Political Science to discuss technical education in this city very recently without apparently remembering that the pioneer institute of this country in experiments of this kind was still enjoying a healthy existence but a short distance from its place of meeting, and might be able to contribute some experiences worthy the attention of the peripatetic body.

The professorships were filled as follows: Chemistry, Wm. H. Keating; Natural Philosophy and Mechanics, Robert M. Patterson; and Architecture, Wm. Strickland.

Professors Keating and Patterson held chairs in the University of Pennsylvania, as did the subsequent Professors of the Institute, Alex. Dallas Bache, John F. Frazer, Henry Reed, Roswell Park, Robert Hare, and the brothers James and Robert E. Rogers.

James Ronaldson

Mr. James Ronaldson was born upon his father's estate, "Georgie," near Edinburgh, Scotland, in 1770. He came to Philadelphia in 1791, and not wishing to be idle he bought an interest in a biscuit bakery, which he maintained for nearly two years, when he entered into partnership with Andrew Binney, in 1794, to manufacture type of various kinds, which was the beginning of the type-founding business in America. This business later on developed into the McKeller, Smith & Jordan Co. of the present time.

James Ronaldson engaged later on in spinning cotton yarns. He owned the "Hillsburg Mills" of 1200 spindles—located on Ridley Creek, fifteen miles below Philadelphia. Ultimately he established the Philadelphia (now the Ronaldson's) Cemetery, to afford citizens of small means decent burial at charges within their means. This was the first cemetery outside those around the church-yards in the city. The west-end walk ground was free to worthy persons who were in straitened circumstances and poor.

He established the first Night School in the Southwark District, and also the first Soup Society for the poor. He had the soup made in a room or kitchen in the rear of his house, where he could at any time test its quality by having samples brought to his table.

He was President of the Mechanical Society, which preceded the Franklin Institute by many years, and eventually was its nucleus. This Society had its rooms on the west side of Third Street, a few doors below Market Street, in the second story in the rear.

He was a personal friend of President Andrew Jackson, but refused a seat in his Cabinet.

He was the President of the Louisville Canal Company, and it may be of interest to add that he had in his employ, as one of his Engineers, the late J. Edgar Thompson, whom he subsequently sent to the Pennsylvania Railroad Company, of which Thompson eventually became President. He was the first President of the Franklin Institute, and occupied the office from 1824 till his death, in 1841.

Franklin Institute Facade before 1830

The first course of lectures was delivered in the old Academy building, belonging to the University of Pennsylvania, in Fourth Street near Arch. Soon a school of Architecture and Mechanical Drawing was established. Among the first pupils was Thomas U. Walter, then a bricklayer, but, thanks to that school, afterwards the architect of Girard College, and ultimately of the Capitol at Washington.

Then a special school of English Literature, Ancient and Modern Languages, Mathematics—a veritable high school—was placed under the direction of Walter R. Johnson.

The corner stone of the present building was laid with appropriate Masonic rites June 8th, 1825.

A better idea can be had of the phenomenal growth of this Institute by running over some of the most important events of its early life than by any other means.

The Institute set out with almost the organization it has at present. An exhibition was held in Carpenters' Hall the first year (1824), and a journal was started the next year largely under its auspices though not owned by the Institute until a couple of years later. This journal was called "The Mechanical Magazine, Register, Journal and Gazette."

Its opening page contains a large wood cut of a pit saw, and further on are cuts of a chemical engine, invented by Captain Munby, of London, for immediate service on the alarm of fire, which is not materially different from those in use to-day. On the cover of the first number it is requested that communications be addressed to James V. Seaman, Broadway, New York. Wm. Van Norden was the printer. In Vol. II was published the prospectus of the new Journal, into which this was to be merged, to be called "The Franklin Journal and American Mechanics Magazine," edited by Thos. P. Jones. In 1826 the membership had increased from 560 to 1065.

This building 60′ x 100′, had been nearly completed, and the second story rented to the United States Marshall for the use of the District Court, on a lease of ten years. The whole expense of the building was $35,000. In 1826, the courses of instruction included Chemistry, Mechanics, and Natural History, besides volunteer lectures on miscellaneous subjects.

Dr. Thomas P. Jones, the Editor of the *Journal*, filled the chair of Mechanics. It is not easy to estimate adequately the services of this distinguished member of the Institute. He conceived and founded at his own expense the *Journal* by which the Institute is principally known abroad, and which accomplished more to establish the high reputation of the Institute in foreign lands than any other thing. He conducted this journal with signal ability for twenty-three years (1825 to 1847, inclusive) and impressed upon it the character it has ever since retained. During its early years and up to the period of development of the Sections, largely through the pertinacious efforts of our present Secretary, Dr. Wm. H. Wahl, the aim of the *Journal* was to reprint the most important articles and papers on scientific subjects which appeared in all countries, on the plan so successfully adopted by Littell's Living Age for literary material. At that time, when the transactions of learned societies, and the scientific publications of foreign countries were difficult to procure, this scientific digest was of immense importance to American scientific men; of much greater importance indeed than any single volume from which excerpts were made; because it placed at the disposal of research men and practical mechanics, information of discoveries and inventions all over the world and up to date, which it would have been impossible for them to procure otherwise. At the same time it laid a heavy burden of expense upon the Editor, and required of him a rare power of selection, conditions fulfilled both by Dr. Jones and by Professor John F. Frazer who, after an interregnum of two years filled by the Committee on Publication, followed him in the Editorship, and retained it for seventeen years. It is not readily realized at the present time when one can consult the scientific publications of many countries in a dozen societies or public libraries, that at that time, say up to 1865, one was obliged to subscribe in order to obtain access to them. And this was done wholly at

Thomas P. Jones

his own personal expense, by each of the first two editors of the *Journal*. A school for Mathematics, under Prof. Jos. P. Espy,* and a Drawing School were also added.

Amongst others, at the exhibition of 1826, Thos. Harrison received a medal for a box of "rose pink of very superior quality." October 26, J. Redman Coxe presented to the Institute "the electrical machine belonging to the immortal Franklin." The high school of the Institute was working well. Evening schools for drawing were begun October 19, 1826. Another exhibition was held for four days in Masonic Hall.

Franklin Institute Drawing School in operation (Recent)

At the 4th annual exhibition in Masonic Hall, October 4 to 8, 1827, tickets were sold at 12½ cents apiece. Members were admitted with two ladies free, but in spite of this low price the Institute was enriched by $738.21. In 1828, the net earnings were $715.

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*James Pollard Espy was born in Westmoreland County, Pa., May 9th, 1788, died in Cincinnati, Ohio, January 21st, 1860. He graduated from Transylvania University in 1808 and shortly after became principal of an academy in Cumberland. Admitted to the bar, he accepted the chair of Mathematics in the Franklin Institute. He published the first of his observations on meteorology in its journal. His theory of storms was received favorably by both the French Academy and the British Association for the Advancement of Science, before which latter body he presented his views in 1840. In 1843, he received an appointment in the War Department, and there first began a service of daily bulletins in conjunction with the newspapers and telegraph companies. He received from the American Philosophical Society in 1836 the Magellanic Medal and Premium.

In 1828, the *Journal* was transferred by its owner and editor Dr. Jones, to the Franklin Institute, which retained him in the latter office. Mr. William Hamilton was appointed Actuary by the Board of Managers at a salary, and served the Institute faithfully till his death, forty years later. Dr. Jones resigned the chair of Mechanics to accept the Superintendency of the Patent Office at Washington, but still retained the editorship of the *Journal* and made it the vehicle of the official publication of all patents issued by the Government.

One of the most notable articles in the *Journal* of this year (p. 352) was the "Combination of a Practical and Liberal Course of Education," by Prof. Walter R. Johnson, Principal of the High School of the Franklin Institute.* In 1829, the title of the

William Hamilton

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*Walter Rogers Johnson was born in Leominster, Mass., June 21st, 1794, and died in Washington, D.C., April 26th, 1852. He graduated at Harvard 1819; following which he taught school in Massachusetts, and still later was Principal of an Academy in Germantown, Philadelphia. He was Principal of the Franklin Institute High School, and filled the chairs of Mechanics and Philosophy. In 1836 he began a series of geological investigations as to coal and iron ore. In 1837 the United States Government put him in charge of magnetic, astronomical, and electrical investigations of an expedition prepared in that year, but he relinquished it. From 1839 to 1843 he was in charge of the department of Physics and Chemistry in the University of Pennsylvania. In 1843 he was commissioned by Congress to investigate the steam-raising qualities of various coals, and produced a work of great value even to the present day. He afterwards was employed by the United States Navy, and then was attached to the Smithsonian Institute, and was sent to the World's Fair in London, in 1851.

Journal was changed to the "*Journal of the Franklin Institute*," &c. The Circuit Court expressed anxiety at the stability of the floor it occupied, which was thereupon strengthened by four cast-iron columns. Monthly meetings were instituted. At a meeting of the Board a committee was appointed to undertake an investigation of the efficiency as a motor of moving water, the first of a series of researches undertaken by the Institute, which like each of the later investigations of the causes of explosion of steam boilers, &c., attained the dignity of a classic in the literature of science and conferred great distinction on the Institute.

Franklin Institute Lecture Room

Franklin's Electrical Apparatus.

It was decided in 1829 to make the exhibitions biennial instead of annual.

In 1830, it was determined to have a certificate of membership, and the design of the certificate was entrusted to America's great artist, Thomas Sully.

At a meeting June 10th of this year, the Board appointed a committee consisting of Wm. H. Keating, Robert Hare,* Samuel V. Merrick, Alex. Dallas Bache, Isaiah Lukens, Jas. J. Rush, James Ronaldson, Frederick Graff, Robert M. Patterson, J. K. Mitchell, Benj. Reeves, Geo. Fox, Thos. P. Jones, Walter R. Johnson, Matthias W. Baldwin, Jas. P. Espy, and George Merrick to inquire into the causes of the explosions of steam boilers—a notable body indeed, whose services any institution might be proud to command.

In 1824, the Professors and Instructors had been Dr. Wm. M. Keating, of the University of Pennsylvania, Chemistry; Dr. Thos. P. Jones, Mechanics; Dr. Godman, Natural History; Wm. Strickland, Architecture. James P. Espy, who later won undying fame for his investigation of storms, directed a school for Mathematics, and there was one for Drawing. Dr. Franklin Bache replaced Dr. Keating in the Professorship of Chemistry in

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*Robert Hare, born in Philadelphia January 17th, 1781, died there May 15th, 1858; was the son of an Englishman who established a large brewery in Philadelphia. He attended lectures on Chemistry and Physics in Penn's city, and before his twentieth year became a member of the Chemical Society of Philadelphia, to which he communicated his discovery of the oxy-hydrogen blowpipe in 1801. He invented the valve cock or gallows-screw for opening communication between separate pieces of apparatus with perfect exclusion of air. In 1816 he invented the calorimotor, later perfected as the deflagrator, for producing great heat by a battery. As a chemist he devised a means of denarcotizing laudanum and detecting minute quantities of opium in solution. In 1818 he was called to the chair of Chemistry in William and Mary College, Va., and in the same year was elected to the Professorship of Chemistry in the University of Pennsylvania (Medical Department), His experiments were noted all over the world for their originality and their large scale. He was a prolific contributor to the scientific journals (especially Silliman's, in which he published 200 papers) and to journals of general scope like the "Portfolio," to which he contributed under the pen-name of Eldred Grayson, a series of articles on Moral Philosophy and Economics. In his latter years he embraced the doctrine of Spiritualism, and published in 1855, New York, a book entitled "Spiritualism Scientifically Demonstrated."

1826. With minor changes this arrangement lasted till 1831, when Franklin Peale, one of the gifted sons of Chas. Willson Peale, divided the curiously combined course of Mechanics and Natural History with Prof. Walter R. Johnson, who took the former subject.

In 1832, another commission was appointed to examine into the resources of Pennsylvania—an action which led to the geological survey of a few years later. Professor Johnson made his name immortal by his report on the steam-raising power of coals, presented to the Secretary of the Navy, Mr. Mason, in 1843. He had been in charge of the Franklin Institute High School, and had replaced Dr. Jones in the chair of Mechanics.

Alexander Dallas Bache

John Kearsley Mitchell

Alexander Dallas Bache, born in Philadelphia July 19th, 1806, and died in Newport, R. I., February 17th, 1867. He was the son of Richard Bache and Sarah, daughter of Benjamin Franklin. From his first education in a classical school of Philadelphia he showed marked aptitude for learning. He entered the United States Military Academy at West Point at fourteen and, though the youngest member, graduated at the head of his class in 1825, without having received a single demerit. He was retained at the Academy after graduation as Assistant Professor of Engineering, with the rank of First Lieutenant. In 1829 he served under Colonel J. C. Totten as Assistant Engineer in the construction of Fort Adams, at Newport, R. I., but resigned from the army in that year. In 1828 he was called to the chair of Natural Philosophy and Chemistry in the University of Pennsylvania, which he filled till 1841. On returning to Philadelphia in 1841, he became interested in the work of the Franklin Institute, and aided it with all his zeal and learning. In 1836 he was entrusted with the organization of Girard College, became its first President, and spent some time in Europe studying educational systems for the purpose of applying them to the institution. In 1841-2 he was Principal of the High School and Superintendent of the Public Schools of Philadelphia. His system has been adopted by many cities. During this time he established the first magnetic and meteorological observatory on the Girard College grounds. In 1843 he was made Superintendent of the United States Coast and Geodetic Survey, which office he filled till his death. During the Civil War he was chief engineer of the defences of Philadelphia. He was one of the incorporators of the Smithsonian Institution in 1846 and annually thereafter was reëlected by Congress. He was given the degree of LL.D by the University of New York in 1836; University of Pennsylvania in 1837; and Harvard in 1851. He was President of the American Philosophical Society and one of the incorporators and founders of the National Academy of Science, as well as its first President He was an Honorary Member of the Royal Society of London; the Institute of France, the Royal Academy of Turin, &c.; yet all of these titles and activities do not adequately express all that he was. He was the embodiment of the highest type of scientific man which America has produced, set in the person of the kindliest and most courteous gentleman.

:John Kearsley Mitchell, born in Shepardstown, Jefferson County, Va., May 12th, 1798, died in Philadelphia April 4th, 1858. He was educated at Ayr and Edinburgh, Scotland, from the age of eight years till his return to America, where he studied medicine under Dr. Nathaniel Chapman, and graduated from the University of Pennsylvania in 1819. He made three voyages to China as ship surgeon, but settled in Philadelphia in 1822. In 1824 he was lecturer at the Philadelphia Medical Institute, and was made Professor of Chemistry at the Franklin Institute in 1833. In 1841 he became Professor of the Theory and Practice of Medicine in Jefferson Medical College. He was a practitioner of medicine highly esteemed and, like his distinguished son, Dr. S. Weir Mitchell, an author of valuable scientific works as well as of poetry and prose fiction.

Nothing strikes one more forcibly than the versatility of the gentlemen who composed the teaching force in the Franklin Institute. Prof. Johnson published in 1832 a notable paper in the *Journal* on the strength of steam boilers. In this year the Secretary of the Treasury requested a further extension of the inquiry to include the prevention of steam boiler explosions. Dr. J. K. Mitchell replaced Franklin Bache as Professor of Chemistry.

In 1833, steel from American iron was exhibited by Karthause, of Baltimore, as a curiosity, and Mr. T. Fletcher showed an "instrument called a chronograph," by Fatton, of France. Dr. Robert Hare showed the model of his double acting air pump.

In 1834, Gouverneur Emerson, M. D., gave his second course on Meteorology. J. Millington, of the Royal Institution of Great Britain, gave a course on Astronomy; Prof. Henry D. Rogers a special course on Chemistry. The drawing school was placed under Wm. Mason, and the English school under Seth Smith. The name of the Committee on Inventions was changed to that of "Committee on Science and the Arts," as at present. The Secretary of the Commonwealth of Pennsylvania presented the Commonwealth's thanks for the report on weights and measures received from the Institute.

In 1835, Titian Peale, another son of C. Willson Peale, described a means to protect butterflies in a collection from injury, and showed a model of Redheffer's perpetual motion,—through a spring concealed in one of the columns of support. Prof. A. D. Bache showed Prof. Henry's spark from a single galvanic pair. The Committee on Science and the Arts reported on Baldwin's locomotives. The Institute determined to sell this hall and purchased the Masonic Grand Lodge Building, in Chestnut Street above Seventh, on the site now occupied by the building erected by the late Wm. M. Singerly. A copy of the claim by Thos. Jefferson for the invention of rendering salt water fresh by distillation was published.

In 1836, the words "and Mechanics' Register" was added to the title of the journal. The name of John C. Cresson first appears in the columns of the *Journal* as having shown a specimen of Alabama cotton in the pod.

Prof. Alex. Dallas Bache presented the ingenious reasoning of Benj. Franklin to explain why the rain- and hail-fall near the surface of the earth is greater than at heights. (Letter to Dr. Percival of 1764), and Mr. Featherstonhaugh was criticised for calling himself "United States Geologist."

The second joint report of the American Philosophical Society and the Franklin Institute on Meteorology was printed; also the "Franklin Kite Club's experiments on atmospheric electricity." John C. Cresson, Chairman. An interesting note appeared on Berzelius' definition of the new force he called "Catalysis." John F. Frazer and J. C. Trautwine presented minerals. Jas. C. Booth lectured on Arts and Manufactures. A note is given on the Filtration of Heat from Solar Rays, by Melloni, and by Dr. Draper, of Hampden-Sidney College, Va., and on Actinism, by

Mrs. Somerville. John C. Cresson was elected to the chair of Mechanics, and McClure to that of "Architecture and Practical Carpentry." Metallic pens tipped with Osmium, by J. J. Hawkins, of London, were shown by Franklin Peale.

On the cover of the *Journal* was printed, "3 sheets under 100 miles 4½ cts, over 100 miles 7½ cts."

John Fries Frazer

John Cresson Trautwine

John Fries Frazer was born in Philadelphia July 8th, 1812, and died there October 12th, 1872. Residing with Dr. Samuel B. Wylie, of Philadelphia, his early education was obtained at Dr. Wylie's classical Academy and at Col. Partridge's Military School, in Norwich, Conn. He graduated from the University of Pennsylvania in 1830, sharing the first honor with the Rev. James Clark. He studied medicine, but though well prepared he did not apply for examination. He studied law and was admitted to the bar. He was first assistant Geologist of the first Geological Survey of Pennsylvania in 1836, and assistant of Professor A. Dallas Bache and Dr. Robert Hare in the University of Pennsylvania. He was Professor at the High School, Professor of Natural Philosophy and Chemistry at the University of Pennsylvania 1844-72. Vice-Provost of the University and Vice-President of the American Philosophical Society, 1855-68, when he resigned both offices. He was one of the incorporators of the National Academy of Science in 1863. He received the degree of LL.D from the University of Lewisburg in 1855, and from Harvard in 1857.

He was the author of many complete treatises on Chemistry, Physics, and Mechanics, which, however, he always printed privately and distributed to his students to assist them in the numerous courses of lectures which he delivered in the University of Pennsylvania and the Franklin Institute.

John Cresson Trautwine was born in Philadelphia March 30th, 1810, and died there September 14th, 1883. In 1828 he entered the office of Wm.

Strickland and soon thereafter designed and superintended the construction of the Penn Township Bank, assisted in constructing the United States Mint, and was engaged in constructing the Columbia Railroad in 1831. He was principal engineer of the Philadelphia, Wilmington & Baltimore Railroad, Philadelphia & Trenton, and of the Hiawassee Railroad of Tennessee to Georgia during the years 1835 to 1842. From 1846 to 1849 he was associated with George M. Totten in the construction of the canal del Dique and the Panama Railroad. He was actively engaged in Porto Rico, Pennsylvania, Montreal, and other places in great engineering works till 1864. He made the most important contributions to the literature of engineering in the professional journals, besides adding to the permanent literature tables and methods of calculation which are prized all over the world. His Civil Engineer's pocket book, originally published in 1872, has passed through the eighteenth edition and eighty-fourth thousand (1906) by the labors of his son and grandson of the same name, and is an almost encyclopædic treasury of all data bearing on the profession of engineering.

In 1838, Prof. E. Otis Kendall's Reduction of Solar Eclipses were published. The Committee on Uniformity of Weights and Measures printed its valuable report. A note from an English journal recorded that Mr. Walter Hancock, steam-car engineer, accompanied by two friends, rode from Stratford to Guildhall, London, in a steam gig, and threaded his way in Cheapside through the throng of carts and wagons without difficulty. This was the first automobile. Dr. John K. Mitchell described an apparatus devised by himself for repeating Thillonier's experiment of liquefying CO_2.

1839. In spite of the prostration of business in 1837 and the consequent failure of the Franklin Institute to dispose of its costly purchase of the Masonic Temple, the rents from tenants in that building paid costs of interest on the investment. Among foreign notes is Arago's announcement to the Institute of France of "photogenic drawings" by Dauguerre. The word "photograph" was first used by Sir John Herschel. Mosander announced a new metal, "Latanium," which has since failed to materialize. A screw propeller was first used to move the "Archimedes," of 230 tons along the English coast. Geary made an artificial fuel like modern briquettes. Dr. Robert Hare showed his new Eudiometer.

1840. Prof. A. D. Bache's report on Education, prepared from notes in Europe during a voyage undertaken for Girard College, was published in the *Journal*. A description of the Philadelphia & Columbia Railroad by W. H. Wilson is interesting. The road started at Broad and Vine Streets, Philadelphia, and ended in the Borough of Columbia on the Susquehanna. Its route was from Broad to Vine, N. E., passing Fairmount Water-works; parallel to the Schuylkill, which it crossed three miles from the city, and mounted an incline plane (Belmont) 2805 feet long and 187 feet high. Thence it followed "the dividing ridge between the Delaware and Schuylkill"(?) 19 miles, &c. John F. Frazer gave a course of lectures on Geology. Dr. Robert Hare announced that in passing from vapor to snow, water would impart

Frederick Fraley

Samuel Vaughan Merrick

Frederick Fraley was born in Philadelphia May 28th, 1804, and died there in 1901. After studying law he engaged in business. He was one of the founders of the Franklin Institute and for many years its Treasurer. He was elected to City Councils in 1834, and as chairman of its finance committee in the panic of 1837 proposed the successfully adopted expedient of issuing certificates of indebtedness in small denominations. In this year he was elected to the State Senate. On the completion of Girard College, in 1847, he became one of its trustees. He was one of those who brought about the consolidation of the city in 1854. He was one of the founders of the Union Club (afterwards Union League). He was a delegate to the Boston Commercial Convention for the establishment of a National Board of Trade in 1868, and was chosen President of this Board annually till his death. He was one of the most active promoters of the Centennial Exposition in Philadelphia and was Treasurer of the Board of Finance. He was elected a member of the Board of Trustees of the University of Pennsylvania in 1853, and President of the American Philosophical Society in 1879, retaining these offices until his death.

To a profound knowledge of affairs and of men he added a singular aptitude for the duties of presiding officer of a deliberative body, and to the very end of his long and useful life he retained the power of accurate memory and felicitous expression, which distinguished him throughout his career.

Samuel Vaughan Merrick was born in Hallowell, Maine, May 4th, 1801. In 1816 he came to Philadelphia and entered the counting house of his uncle. At the age of twenty-three he was one of the founders of the Franklin Institute, and was its President from 1852 to 1855. He studied engineering, and in 1836 established in South Philadelphia the Southwark Iron Foundry, which became the best works of the kind in the country. He was elected a member of Councils of Philadelphia, was sent to Europe to investigate the method of using illuminating gas, and aided in having it introduced into Philadelphia. He was a member of the American Philosophical Society from 1833 till his death, which occurred in Philadelphia August 18th, 1870.

as much heat to the air as twice its weight of red hot powdered glass. The collaborators of Dr. Thos. P. Jones in editing the *Journal* were now, John C. Cresson, James C. Booth, John F. Frazer, J. Griscom, Thomas U. Walter, J. C. Trautwine, A. D. Bache, Sears C. Walker, Samuel V. Merrick, Frederick Fraley, Thompson S. Browne, W. H. Emory, Ellwood Morris, Sol. W. Roberts and Thomas F. Moss.

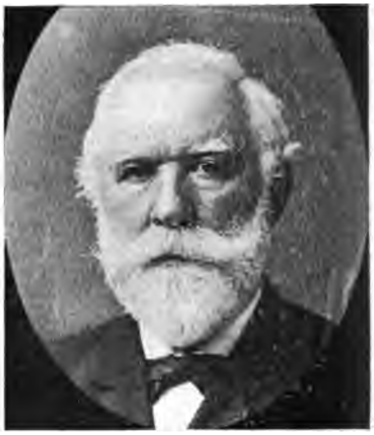
The closing address of the very successful exhibition of 1845 was made by John F. Frazer.

The following is a list of the officers of the Institute since its foundation:

Presidents.—James Ronaldson, 1824 to 1842; Samuel V. Merrick, 1842 to 1855; John C. Cresson, 1855 to 1864; William Sellers, 1864 to 1867; J. Vaughan Merrick, 1867 to 1870; Coleman Sellers, 1870 to 1875; Robert E. Rogers, 1875 to 1879; William P. Tatham, 1879 to 1886; Chas H. Banes, 1886 to 1887; Joseph M. Wilson, 1887 to 1897; John Birkinbine, 1897 to 1907; and Walton Clark, 1907 to date. It is the hope and belief of the friends of the Institute that our present President is the Moses who is to lead the faithful supporters of this institution out of the Seventh Street wilderness into the promised land of the Fairmount Park Boulevard.

Vice-Presidents.—Matthew Carey, 1824 to 1829; Paul Beck, Jr., 1824 to 1828; Thomas Fletcher, 1828 to 1853; Isaiah Lukens, 1829 to 1846; Abraham Miller, 1846 to 1855; John Agnew, 1851 to 1864; Matthias W. Baldwin, 1855 to 1864; John H. Towne, 1864 to 1869; Fairman Rogers, 1864 to 1867; John F. Frazer, 1865 to 1867; Coleman Sellers, 1867 to 1870; Robert E. Rogers, 1868 to 1875; Bloomfield H. Moore, 1869 to 1875; H. G. Morris, 1870 to 1875; George Ereby, 1867; Chas S. Close, 1875 to 1880; Frederick Graff; Joseph E. Mitchell, 1876 to 1888; Henry Cartwright, 1880; Wm. P. Tatham, 1888 to 1900; Edw. Longstreth, 1892 to 1895; S. Lloyd Wiegand, 1892 to 1895; H. R. Heyl, 1895; Theodore D. Rand, 1900 to 1906; George V. Cresson, 1901 to 1904; Henry Howson, 1904 to date; Washington Jones, 1902 to date; James M. Dodge, 1905 to date.

John Chapman Cresson



William Sellers

John Chapman Cresson was born in Philadelphia in 1806 and died there in 1876.

He was educated in the Friends' Academy, attended lectures in the University of Pennsylvania. In 1834, he engaged in business in Philadelphia and was made Superintendent and Engineer of the Philadelphia gas works, which office he held for twenty-eight years.

He was given the chair of Mechanics and Natural Philosophy in the Franklin Institute in 1837, and held a similar office in the High School for two years. He was for many years a Manager and Vice-President of the Pennsylvania Institute for the Blind, and was connected with many other charitable institutions. He was a Manager of the Schuylkill Navigation Company, President of the Mine Hill & Schuylkill Haven Railroad Company 1847-76, and one of the original Fairmount Park Commissioners after serving as Chief Engineer of that park.

William Sellers was born in Upper Darby, Philadelphia, September 19, 1824, educated at a private school, apprenticed to his uncle as a machinist in 1838. In 1845 he was made Superintendent of the Fairbanks and Bancroft Machine Works, in Providence, R. I. In 1848, Bancroft & Sellers formed a partnership in Philadelphia till 1855, when the firm changed to Wm. Sellers & Co. He was elected President of the Franklin Institute in 1864; in 1868 Trustee of the University of Pennsylvania; in 1873 member of National Academy of Science. He died in Philadelphia January 24, 1905.

Secretaries.—(Recording and Corresponding till 1865.)

Recording.—William Strickland, 1824 to 1827; T. P. Jones, 1827 to 1829; Algernon E. Roberts, 1829; James H. Bulkley, 1830 to 1833; W. S. Perot, 1833 to 1835; John C. Trautwine, 1835 to 1837; I. B. Garrigues, 1837 to 1864; Washington Jones, 1864.

Corresponding.—P. A. Brown, 1824 to 1828; Isaac Hays, 1828 to 1839; A. D. Bache, 1839 to 1844; Ellwood Morris, 1844; John F. Frazer, 1845 to 1847; Solomon W. Roberts, 1847 to 1854; John C. Cresson, 1854; Frederick Fraley, 1855 to 1864; Robert Briggs, 1864.

Recording and Corresponding Secretaries were replaced by one Secretary from 1864.

Secretary.—Henry Morton, 1868 to 1871; Wm. H. Wahl, 1871 to 1875; J. B. Knight, 1875 to 1880; Isaac Norris, 1880 to 1882; Wm. H. Wahl, 1882 to date.

Treasurer.—Thomas Fletcher, 1824 to 1826; John Richardson, 1826 to 1828; Samuel V. Merrick, 1828 to 1830; Frederick Fraley, 1830 to June, 1847; C. B. Trego, June, 1847, to 1848; John F. Frazer, 1848 to 1865; Frederick Fraley, 1865 to 1883; Samuel Sartain, 1883 to 1907; Wm. H. Wahl, 1907; Cyrus Borgner, 1908 to date.

Actuary.—William Hamilton, 1828 to April, 1871; Wm. H. Wahl, to 1872; David S. Holman, 1872 to 1885; H. L. Heyl, 1885 to 1908.

Among the earlier Professors, instructors, and lecturers have been Wm. M. Keating, Thos. F. Jones, D. Godman, Wm. Strickland, Franklin Bache, J. K. Mitchell, Franklin Peale, William Mason, John McClure, H. D. Rogers, James P. Espy, James C. Booth, John C. Cresson, John F. Frazer, J. Rufus Mason, Thomas U. Walter, Robert E. Rogers, and many more.

Editors of the Journal.—Thomas P. Jones, 1825 to 1847; Committee on Publications, 1848 and 1849; John F. Frazer, 1850 to 1867; Henry Morton, 1867 to 1870; H. Morton and Wm. H.

Wahl, 1870 to 1871; Wm. H. Wahl, 1871 to July, 1874; George F. Barker, July, 1874, to July, 1875; Robert Briggs, July, 1875, to 1877; Committee on Publication to date.

Among the distinguished members of and workers for the Franklin Institute should be named: John Sartain, Frederick Graff Charles Bullock, Henry C. McCook, Harvey Washington Wiley, George W. Melville, Robert H. Thurston.

John Vaughan Merrick

Coleman Sellers

John Vaughan Merrick was born in Philadelphia April 30, 1828; graduated at the Central High School 1843. Studied engineering in Philadelphia works. He was a partner in Merrick & Sons, founded by his father; Vice-President of the Zoölogical Society of Philadelphia 1886; President of the Free and Open Church Association; Trustee of the University of Pennsylvania from 1870 till his death, and Vice-President of the American Society of Mechanical Engineers from 1883 to 1885. He died in Philadelphia March 28, 1906.

Coleman Sellers was born in Philadelphia January 28th, 1827, and died there December 28th, 1907. He was educated by his mother, at the school of the Franklin Institute, and by Bolmar, in West Chester, Pennsylvania. In his nineteenth year he went to the Globe rolling mill, Cincinnati, Ohio, for three years, during part of which time he was Superintendent. He then served with Niles & Co. for five years in the manufacture of locomotives. In 1856 he returned to Philadelphia and became Chief Engineer of William Sellers & Co.'s works until 1888, when he retired from active direction in the firm and devoted himself to private practice. He obtained more than thirty patents for inventions, many of which of universal application. He was Professor of Mechanics at the Franklin Institute for twenty-three years. On his retirement from active practice the Stevens Institute of

Technology, at Hoboken, N. J., created a chair for him of Engineering Practice, and in 1887 he received from that institution the degree of Doctor of Engineering. In 1889 he reported on the practicability of generating power at Niagara Falls. Subsequently he was made Chairman of the Cataract Construction Company, participated in the organization of the International Commission in London, where his colleagues were Lord Kelvin, Turrettini, Mascart, and Unwin. He was made chief engineer of the construction company, succeeded against the views of Lord Kelvin in convincing the Commission of the advantage of an alternating current, and carried the enterprise to a splendid commercial success.

Robert Empie Rogers

William Penn Tatham

Robert Empie Rogers was born in Baltimore, Md., March 29, 1813. Educated by his father and afterwards by his brothers. He intended to become a civil engineer, and was assistant in the survey of the Boston & Providence Railroad. He abandoned this work in 1833 and graduated in the medical department of the University of Pennsylvania in 1836, taking the full course in chemistry under Dr. Robert Hare. In 1841-2 he was instructor in Chemistry at the University of Virginia. In 1852 he replaced his brother, James, as Professor of Chemistry in the University of Pennsylvania, becoming dean of the Medical Faculty in 1856. In 1877 he became Professor of Chemistry and toxicology at Jefferson Medical College, Philadelphia, and became Professor emeritus there in 1884. During the civil war he was Acting Assistant Surgeon, stationed at the West Philadelphia Military Hospital. He received the degree of LL.D. by Dickinson College in 1877. He was one of the incorporators of the National Academy of Science, and President of the Franklin Institute from 1875 to 1879. He died in Philadelphia September 6, 1884.

William Penn Tatham, who died on August 5, 1899, was born near Frankford, Philadelphia, in the year 1820. In 1840, he and his brothers formed a partnership for the purpose of manufacturing lead pipe and sheet lead. The most important feature of their business was the introduction into this country of solidly-drawn lead pipe. On his return home, in 1850, he became a member of the Franklin Institute; in 1870 he was elected a member of the Board of Managers, and in 1879 was elected to the Presidency of the Institute, and held that position until the end of 1885. He was then re-elected a member of the Board of Managers, and in 1887 was elected one of the Vice-Presidents, and continued in that office until failing health caused his retirement in 1897. During his long connection with the Franklin Institute he was constant in his devotion to the advancement of its objects, and identified himself with all its important transactions. For fifteen years Mr. Tatham held the congenial position of Chairman of the Committee on Library. He was Chairman of the Committee on Exhibitions in 1874, on the occurrence of the semi-centennial anniversary of the foundation of the Franklin Institute, when the Board of Managers resolved to commemorate the event by holding an exhibition of American manufactures.

Mr. Tatham was largely instrumental in the organization of the Pennsylvania State Weather Service in 1887, in connection with the U. S. Weather Bureau, which lent its active cöoperation to that end. He acted as Chairman of the Committee on Meteorology during the entire period in which the Institute conducted this work, and until the transfer of the Weather Bureau work to the newly-created Department of Agriculture removed the direction of the service from the control of the committee.

Among the papers that he contributed to the Franklin Institute it may be noted that as chairman he was the author of a majority report of the committee on the "Enforced Adoption of the Metric System," in place of our present system of metrology. This report was adverse to its adoption, and is worthy of note as a full yet concise history of the subject, and a valuable contribution to its literature. In its action thereon the Institute committed itself against the enforced adoption of the metric system, but approved the legalized use of it in whatever case or under whatever circumstances it should prove most useful to those who elected to employ it.

Mr. Tatham was elected a member of the American Philosophical Society in April, 1875; he was promptly elected as a Councillor, and in 1897 was made Chairman of the Committee on Finance, and served as Treasurer *pro tem.* upon the decease of the Treasurer, Mr. J. Sergeant Price. He was also a member of the committee appointed to devise a plan for increasing the facilities for the society by enlarging the space to be devoted to the display of its books.

During Mr. Tatham's term as President of the Franklin Institute the dress sword, which was worn by Dr. Franklin upon State occasions, was devised by one of his descendants, Mr. R. Meade Bache, who was then in possession of that historic relic, to the President of the Franklin Institute. This sword had been entrusted to the care of the Historical Society until such time as the Franklin Institute could provide a safe depository for it. This interesting relic is now in the custody of the Institute.

Charles Henry Banes was born in the City of Philadelphia October 24, 1831. He received a public school education and was graduated from the Central High School of Philadelphia in 1847. At the close of his school life he became interested in mercantile pursuits, in which he continued to be engaged until the breaking out of the war of the rebellion in 1861, when he entered the United States Service as Captain of Company E of the 72d Regiment of Pennsylvania Volunteers, continuing in the service until June, 1864. His faithfulness, gallantry and ability in military life are matters of historical record, so that it will only be necessary here to give the following summary. He commanded his company at the siege and capture of Yorktown, in 1862, and in the battle of Fair Oaks, May 31, 1862, Seven Pines, June 1st, 8th and 9th; Garnet Farm, June 15th and 18th; Savage Station, June 28th; Peach Orchard, June 29th; Glendale, June 30th; Malvern Hill, July 1st; Chantilly, September 1st; Antietam, September 13th and 17th, and Frederick, December 13th, 1862. On the 26th of December, 1862, having received honorable mention for gallantry in the battle of Fredericksburg, in which engagement he was wounded, he was appointed Assistant Adjutant-General, and confirmed by the Senate May 15th, 1863. He took part in the battles of Chancellorsville, May 12th, 1863; Haymarket, June 24th; Gettysburg, July 2d and 3d, when he was again wounded and honorably mentioned for bravery and gallantry. He was also engaged in the battles of Robertson Tavern, November 26th; Mine Run, December 2d, where again he was honorably mentioned, and in the battle of the Wilderness, May 5th and 7th, 1864; Spottsylvania, May 8th to the 18th; Po River, May 9th; North Anna, May 23d and 27th; Tolopotomy, May 28th; and Cold Harbor, June 1st to the 4th, 1864, where he was so severely wounded as to be incapacitated for further service. He was breveted Major for his gallantry at Gettysburg, and Lieut.-Colonel after the battle of Spottsylvania.

Charles Henry Banes

Colonel Banes became a member of the Franklin Institute in October,

1874. He was elected to the Board of Managers of the Institute in January, 1877, and continued a member of this body until 1895, when he declined reelection on account of press of business and ill health. He was President of the Institute during the year 1886. In connection with the work of the Franklin Institute, Colonel Banes is, perhaps, best known on account of the marked ability, the untiring energy, and the rare executive powers which he exhibited at the International Electrical Exhibition, held in Philadelphia in 1884. Considered from the standpoint of the Franklin Institute, this exhibition may justly be regarded as the most important public work the Institute has ever undertaken. Considered from the standpoint of the electrical world, this exhibition has, probably, done more in advancing the cause of electrical science, by placing on public exhibition the products of electricity from different parts of the world, than has any exhibition held prior to 1884. Nor was this due entirely to the exhibits. At the same time, as a natural outgrowth of the exhibition, a National Conference of Electricians was held under the direction of an United States Electrical Commission, created by an Act of Congress, and approved by the President in May, 1884, the Act authorizing the appointment of a scientific commission, "Which may, in the name of the United States Government, conduct a National Conference of Electricians in Philadelphia in the autumn of 1884."

Joseph Miller Wilson

John Birkinbine

Joseph Miller Wilson was born in Phoenixville, Pa., June 20, 1838; was graduated at the Rensselaer Polytechnic Institute in 1858, and studied Chemistry under Dr. F. A. Genth. He was made Assistant Engineer on the Pennsylvania Railroad in March, 1860, and in 1867 was given charge of all bridges and buildings on the line of that road from New York to Pittsburg and from Canandaigua to Quantico, Virginia. In 1874-6 he was joint engineer with Henry Pettit of the main exhibition building and of Machinery Hall for the Centennial World's Fair at Philadelphia. In January, 1876, with his brothers, he organized the firm of Wilson Bros. & Co. He was President of the Franklin Institute from 1887 to 1897, and President of the Engineer's Club in 1888. He died in Philadelphia November 24, 1902.

John Birkinbine was born in Philadelphia in 1844; studied in the Polytechnic College of Pennsylvania. He served as assistant to his father, who was Chief Engineer of Water Supply for Philadelphia. He was special agent of the 11th and 12th Census. He was President of the American Institute of Mining Engineers 1891-3; President of the Engineer's Club 1893; President of the Franklin Institute 1897 to 1907; President of the Pennsylvania Forestry Association since 1897; Editor of "Iron Workers" for nine years, and is now Editor of "Forest Leaves."

Walton Clark

Matthias William Baldwin

Walton Clark was born April 15, 1856, at Utica, N. Y. He had a common school education. He began work in the New Orleans gas works at the age of seventeen, and has been in the gas, electric light and street railway business ever since. He is Third Vice-President of the United Gas Improvement Company, in charge of the engineering and operating departments. He is a member of the Society of the Cincinnati, the University Club, the Union League, the Racquet Club, and other Philadelphia and New York clubs. He is a member of the American Gas Institute, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the American Academy of Social and Political Science, and of several State Gas associations. He is ex-President of the American Gas Light Association; ex-President of the American Gas Institute; President of Franklin Institute of Pennsylvania; member of the Board of Trustees of the Chestnut Hill Academy; member of the Board of Trustees of the Pennsylvania Military College; and founder and Chairman of the Board of Trustee of a free correspondence school for gas-works employees. He was awarded the honorary degree of Mechanical Engineer by the Stevens Institute of Technology. He was a member of the Municipal Ownership Commission of the National Civic Federation, and of its organizing and investigating committees, being engaged for nearly two years on the work of this Commission. He lives at Chestnut Hill and has been a resident of Philadelphia for nineteen years.

Matthias William Baldwin was born in Elizabethtown, N. J., December 10, 1795, and at the age of sixteen was apprenticed to a firm of jewelers in Frankford, now Philadelphia. In 1819, he went into business for himself and patented a process for gold plating, since universally adopted. He then commenced the manufacture of book binders' and calico printers' tools for the first time in this country.

In 1828, he built a five horse-power engine which was employed at his own works. In the latter part of 1830 he saw a locomotive which had been purchased in England, and after four months' labor he produced a beautiful model of it

Isaac Hays

The first locomotive he made was for the Philadelphia and Germantown Railway, which commenced service November 23, 1832. During the next three years he received orders for nine or ten locomotives. In 1835 he moved his works to the corner of Broad and Hamilton Streets. His improvements, notably the flexible truck, patented August, 1842, were numerous. His works have acquired a world-wide reputation and have produced not far from a thousand locomotives in a year.

He was a member of the Constitutional Convention of Pennsylvania in 1837, and of the Pennsylvania Legislature in 1853; and was President of the Horticultural Society of Pennsylvania. He died in Philadelphia September 6, 1866.

Isaac Hays was born in Philadelphia July 5th, 1796, and died there April 13th, 1879. He was graduated from the University of Pennsylvania

(Arts) in 1816, and (Medicine) 1820. In 1827 he became Editor of the "Philadelphia Journal of the Medical and Physical Sciences," of which the name was changed to the "American Journal of the Medical Sciences." In 1843 he established the "Medical News," and in 1874 the "Monthly Abstract of Medical Science." He was President of the Academy of Natural Sciences 1865 to 1869. He was one of the founders of the Franklin Institute and for many years its able Secretary. He was distinguished for his learning and high character as well as for his eminent professional attainments. He was one of the founders of the American Medical Association, and the author of its code of ethics, which has been adopted by every State and County Medical Association in the United States.

Henry Morton

William Henry Wahl

Henry Morton was born in New York City December 11, 1836, graduated in the University of Pennsylvania in 1857, and took a post-graduate course in chemistry. He was instructor in chemistry in the Protestant Episcopal Academy of Philadelphia. In 1863 he lectured on chemistry at the Franklin Institute, and assisted in founding the Philadelphia Dental College, of which he became the first professor of chemistry. In the following year (1868) he became Resident Secretary of the Franklin Institute. During the absence of Professor John F. Frazer in Europe, 1867-8, Prof. Morton temporarily took his chair in the University of Pennsylvania, and on Prof. Frazer's return to Philadelphia, Prof. Morton gave instruction in Chemistry during 1869. In 1870, Prof. Morton was made President of the Stevens Institute of Technology, and laid out the courses of instruction in that Institute, presenting it with a work shop costing $10,000, and electrical apparatus costing $2,500. In connection with his photographs of the solar eclipse of 1869 he first established the cause of the bright line in the Sun's disk next to the moon as a local chemical action in the development of the plate. He joined Henry Draper in the latter's private expedition to observe the total eclipse of 1878 at Rawlins, Wyo. In 1873, he made researches into the fluorescent and absorbent spectra of the Uranium salts, of pyrene, and of a substance found by him in petroleum residues and named Thallene. In 1878 he succeeded Prof. Joseph Henry on the Light House Board. He obtained the degree of Ph.D. from Dickinson College in 1869, and from Princeton in 1871. He was elected to the National Academy of Science in 1874. He died May 9, 1902.

William Henry Wahl was born in Philadelphia December 14, 1848, and educated in the public schools and in Dickinson College, from which he graduated in 1867. He pursued special courses in chemistry, geology and mineralogy in the University of Heidelberg, from which he obtained the degree of Ph.D. in 1869. He was instructor in Science at the Protestant Episcopal Academy 1871-3, Professor of Physics and Physical Geography in the Philadelphia Central High School 1873-4, Editor of the "Polytechnic Review" 1876-8; Associate Editor of the "Engineering and Mining Journal" 1878-80; Editor of the "Manufacturer and Builder" 1880-95, and Resident Secretary of the Franklin Institute 1870-74, and from 1882 to the present date.

Jacob Brown Knight

Jacob Brown Knight was born near Brownsville, Jefferson County, N. Y., June 2, 1833. His ancestors, Giles and Mary Knight, were members of the Society of Friends, and came to America with William Penn, in the ship "Welcome," in the year 1682. They settled in Byberry, Philadelphia County, Pa., where their descendants are numerous. The subject of this memoir was named after an uncle of his mother, Major-General Brown, a distinguished officer of the war of 1812. He received his early education at the Watertown Institute, and in his youth exhibited a taste for mechanical pursuits. He afterwards received a practical training in the machine works of Hoard & Sons, Watertown, and in those of Merrick & Sons, in this city. His health failing, in 1855 he went to the South and was engaged in the erection of sugar and cotton machinery, when the breaking out of the rebellion proved disastrous to his fortunes. He then became a consulting engineer in the City of New Orleans, and was an officer of a society of engineers established there, and was an occasional contributor to DeBow's Review. Mr. Knight was elected a member of the Franklin Institute September 13, 1873, and evinced his interest in this body by occasional gratuitous services. In April, 1874, as a member, he volunteered his assistance in the preparations for the Exhibition to take place in the ensuing fall. In this position his assiduity, good judgment, zeal, intelligence and good address, pointed him out as a suitable person for the position of General Superintendent, and to this position he was appointed by the Chairman of the Committee on Exhibitions, upon the first of July, 1874. Subsequently he was appointed Secretary *pro tempore* of the Institute, and was elected to that office at the annual election in January, 1875. He was continued in the office by successive re-elections, and exercised the functions until about ten days before his death, which occurred March 10, 1879.

At the time of his death, Mr. Knight was Secretary of the Franklin Institute, Editor of the *Journal* of the Institute, Representative of the Institute in the Board of Trustees of the Pennsylvania Museum and School of Industrial Art, Vice-President of the Young Engineers' Club, and Member of the American Philosophical Society.

Isaac Norris

Samuel Sartain

Isaac Norris was born in Philadelphia June 12, 1834, graduated from the University of Pennsylvania (Arts) in 1852, and from the Medical College in 1855. He was acting Assistant Surgeon U. S. A. from 1862 to 1865; Professor of Chemistry at the Philadelphia Central High School 1866 to 1876; Physician at the Philadelphia Dispensary 1865 to 1867; Secretary of the Franklin Institute 1878 to 1881, and Secretary of the College of Physicians 1885.

Samuel Sartain, son of John Sartain, was born in Philadelphia October 8, 1830. At the age of sixteen years he began to engrave under his father's instruction, but after his twenty-first year was in business for himself. His prints include "Clear the Track!" after Schuessele, "Christ Blessing Little Children," after Sir Charles L. Eastlake (1861), &c. He has devoted his energies principally to designing, portraits and other plates for books. He held offices in the Artists' Fund Society, in the Franklin Institute, of which he was Treasurer from 1883 to 1907, and in other Societies. He died December 20, 1906.

David Shepherd Holman

David Shepherd Holman, who was Actuary to the Franklin Institute from 1871 to 1885, died at Bangor, Maine, on May 13, 1901.

Mr. Holman was born in Milo, Maine, in 1826, and at the time of his death was in his seventy-fifth year. He became identified with the Institute as a member in 1866, and at once took an active interest in its work. Although he was to a great extent self-educated, and had not enjoyed the advantages of early scientific training, he succeeded in becoming a skillful microscopist, and, being gifted with great mechanical ingenuity, devised a number of useful microscopic accessories, with some of which his name is associated. Of these, perhaps, the best known are the so-called "Holman life-slides," which he devised for the purpose of facilitating the study of the vital functions in living animals. He also originated other devices and methods for illustrating the circulation of the vital fluids in animals and plants, which gained for him considerable local repute.

He was mainly instrumental in the foundation of the Optical Section of the Franklin Institute, in the year 1872, the first Section to be founded in the Institute.

Mr. Holman was among the first to foresee and appreciate at their true value the great advantages of the typewriting machine at the time of its first introduction, and when the future of this great time- and labor-saving device was still problematical. From the beginning, his faith in the universal applicability of the typewriter, with the supplementary aid of stenography, was unbounded. He gave practical form to his ideas on this subject by founding, in 1873, at the Institute, a school of stenography and typewriting, which soon was largely attended and most successful. All this seems but a commonplace matter from the point of view of to-day, but the local stimulus that Mr. Holman's pioneer work gave to the modern art of correspondence was unquestionably of great value, and he is entitled to the fullest recognition for this service.

John Sartain

Frederick Graff

John Sartain was born in London October 24, 1808, where he learned line engraving. In 1828 he began to practice mezzo-tints, introducing that art into the United States, to which he came in 1830. In 1843 he became proprietor and editor of Campbell's Foreign Semi-monthly Magazine, and thereafter devoted himself to engraving and to literary work. In 1848 he purchased a half interest in the "Union Magazine" of New York, which he transferred to Philadelphia, changing its name to "Sartain's Union Magazine." The framing prints from his studio include "Christ Rejected," after Benjamin West; "The Iron Worker and King Solomon" (1876); "John Knox and Mary Queen of Scots," after Leutze; "Edwin Forrest," "The Battle of Gettysburg," after Rothermel, &c. He held various offices in the Artists' Fund Society,the School of Design for Women, and the Pennsylvania Academy of Fine Arts. He was in charge of the Art Department at the Philadelphia Centennial World's Fair. He designed the monument to Washington and Lafayette in Monument Cemetery, Philadelphia. He died October 24, 1897.

Frederick Graff, Civil Engineer, was born in Philadelphia May 23d, 1817, son of Frederick-Judith (Swyer) Graff. His great-grandfather, Jacob

Graff, came from Germany to Philadelphia in 1741; his grandfather, Jacob Graff, 2d, was a builder, and his father (1774-1847) designed and constructed the water-works of Philadelphia, and was its chief engineer until his death. It was his wish that his son should engage in mercantile pursuits; but a short experience in a large hardware house satisfied the young man that this occupation was not congenial, and entering on the study of engineering, he, on April 6th, 1842, became an assistant engineer on the Philadelphia water-works. On his father's death, in 1847, made chief engineer, and held that position until 1856. He was again elected to the office in 1866, and served for six years, after which he declined re-election. He was the Manager of the Port Richmond Iron Works of Philadelphia (1860-63); associated with H. R. Worthington in the development of pumping machinery for water-works (1873-77); and during the next ten years was frequently called on as an expert in engineering matters connected with the water supply of cities, especially as regarded pumping machinery. In March, 1873, he became a member of the American Society of Civil Engineers, and was President of the Society in 1885. He visited Europe twice, making on the second occasion, in 1878, quite an extended tour. The record of Mr. Graff's professional career, embracing as it did the entire reconstruction and enlargement of the water-works of Philadelphia, which in its day was one of the great engineering works of the country, covers but a small portion of the services he rendered his native city. In 1851 he presented to the city government the suggestion of establishing a park upon the banks of the Schuylkill, which resulted in the development of the great Fairmount Park system, in which he was actively engaged as one of the Park Commissioners. He was a member of the Franklin Institute from 1839 until his death, being one of its managers for six years, and Vice-President for three years; was one of the founders of the Zoölogical Society and Gardens of Philadelphia, and after 1882 was its President; was President of the Engineers' Club of Philadelphia in 1880, and was for six years President of the Photographic Society, of which he was one of the founders. As a devout adherent of the Protestant Episcopal Church and an earnest worker, many important interests both religious and civil were entrusted to his management. Mr. Graff was married to Elizabeth, daughter of Captain John Mathieu, of Philadelphia, who survived him. He died in Philadelphia, Pa., March 30, 1890.

Charles Bullock, 6th President of the Philadelphia College of Pharmacy, from 1885 to date (1891), was born in Wilmington, Del., in 1826, a descendant of a prominent family of Friends, whose ancestors were early settlers in New Jersey. His father, the principal of a boarding school for boys in Wilmington, was widely known as one of the most popular and successful educators of his time. After receiving a thorough training in his father's school, he completed his education at Haverford College, near Philadelphia. Early in his career he evinced a special taste for the study of the natural sciences. The fondness was further stimulated and developed by frequent intercourse with his uncle, John Griscom, LL.D., of New York City, one of the first persons in America to introduce into schools systematic instructions in chemistry. After leaving college, Mr. Bullock entered the employ of Smith & Hodgson, Sixth and Arch Streets, Philadelphia, the senior member of the firm being Daniel B. Smith, who for many years was President of the College of Pharmacy and a member of the Faculty of Haverford College. In this store he acquired a knowledge of the business, and was graduated from the College of Pharmacy in 1847. Soon afterward, in connection with E. A. Crenshaw, he succeeded to the business of his employers, and the firm of Bullock & Crenshaw was formed and entered upon its prosperous career. They made a specialty of furnishing physicians with their outfits, and pharmacists with their drugs and chemicals, and the firm soon became favorably known throughout the country for the excellence and superior character of their supplies. Mr. Bullock developed an increased interest in chemistry, and in 1851 visited the large cities of Europe on a tour of investigation for better information regarding the importation of chemicals and chemical apparatus for scientific use. The firm has since made this an important part of their business. His fondness for chemical research induced him to engage in preparing chemicals for experimental and analytical purposes, and in this department the firm of Bullock & Crenshaw has long been recognized as foremost in the country. Mr. Bullock began his contributions to the literature of chemistry and pharmacy in 1848, by an article on "Kalmia Latifolia" in "The American Journal of Pharmacy." Since then fifty or more valuable contributions from his pen, showing investigation and research in his chosen field of science, have appeared in the same journal and in the Proceedings of the Pharmaceutical Association, of which he has long been a member, and was its Vice-President in 1876. He has published an exhaustive article on "Akaloids of Veratrum Viride," which attracted considerable attention among investigators of medicinal plants. Mr. Bullock

Charles Bullock

Robert Henry Thurston

has always taken a deep interest in the welfare of the College of Pharmacy. He served a long time as Secretary and Vice-President in succession, and since 1885 has been President of the College. He is Vice-President of the Franklin Institute and a member of the American Philosophical Society and of the Academy of Natural Sciences of Philadelphia. He was for many years a vestryman of the historic Christ's Episcopal Church, of Philadelphia, and is now a vestryman of St. Peter's Church, Germantown.

Henry Christopher McCook

Harvey Washington Wiley

Henry Christopher McCook was born in New Lisbon, Ohio, July 3, 1837. After learning the printer's trade and teaching for several years, he was graduated at Jefferson College, Pennsylvania, in 1859. He studied Theology privately and in the Western Theological Seminary at Allegheny, Pennsylvania, and after serving for nine months as First Lieutenant and Chaplain in the army, had pastorates at Clinton, Illinois, and St. Louis, Missouri. In 1869 he became pastor of the Seventh Presbyterian Church in Philadelphia, now known as Tabernacle Presbyterian Church. He has published valuable papers on the habits of American ants and spiders, is Vice-President of the American Entomological Society, and of the Academy of Natural Sciences, Philadelphia. The degree of D.D. was conferred upon him by Lafayette College in 1880.

Harvey Washington Wiley was born in Kent, Indiana, October 18, 1844; graduated at Hanover College in 1867; and at Harvard in 1873. He was Professor of Chemistry at Purdue University 1874-83; State Chemist of Indiana 1881-3; Professor of Agricultural Chemistry in the graduate school Columbian University since 1895; delegate from the United States to the Fourth International Congress of Applied Chemistry, Paris, 1900; Chief of the Bureau of Chemistry in the Department of Agriculture from 1883 to the present date, and is Professor of Agricultural and Hygienic Chemistry in the Franklin Institute.

The complete list of private benefactions and endowments to the Franklin Institute here follows:

James Ronaldson, first President	$ 500.00
A. Miller, a legacy	1819.77
Algernon S. Roberts, for the purchase of books	800.00
Branabas H. Bartol, for the endowment of a scholarship in the drawing school	1000.00
For the building fund	500.00
Elliott Cresson, for his Gold Medal	1000.00
Henry Seybert, for purchase of books, $500; for building fund, $2000.	2500.00
Uriah A. Boyden, for solution of a problem in light (lately awarded and paid to Paul R. Heyl)	1000.00
John Lenthall, his library	———
Joseph Newmann, residuary interest in his estate	(not yet paid)
John Turner, the income of (about)	1000.00
Mrs. W. B. Rogers, chemical library of Robt. E. Rogers	———
Edward Longstreth, for his Silver Medal	1000.00
Geo. S. Pepper, in all to date (endowment fund)	34437.50
Mrs. Fred'k Graff, valuable drawings and engravings	———
Eugene Nugent, legacy to endowment fund	1000.00
	$51,157.27

In all $51,157.27, of which $12.400 is for specific purposes and only $38,757.27 is available as an unconditional endowment which represents an income of less than $2000. To this should be added occasional gifts, amounting perhaps to $20,000, which generous members, especially among the managers and officers, have from time to time given unconditionally to meet some emergency which was pressing.

The average annual cost of running the Institute in late years has been about $20,000, of which less than one-tenth is covered by its income; the remainder from members' dues, the profits of the *Journal*, and irregular contributions of the members and a few among the public, aided too frequently by funds extracted from the Institute's accumulated profits, principally from the Exhibition of 1874, which are now pretty well exhausted.

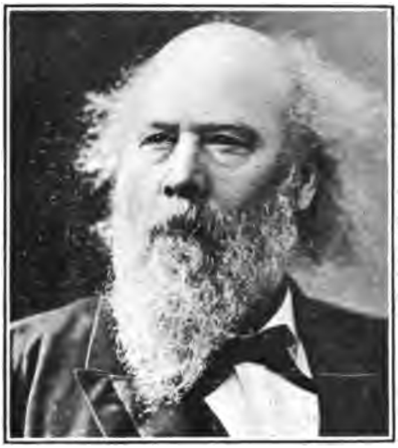
Neither the Federal Government, the Commonwealth, nor the municipality has ever contributed one cent to support the Institute; monies or instruments having been given to it only when special labors from which the givers would benefit have been required and received in return.

SERVICES.

Among the services rendered to mankind by the Franklin Institute may be reckoned the institutions which have budded from it.

It is not too much to claim our Philadelphia High School as an off-shoot from the Franklin Institute, which abandoned its own high school when the standard of public education was raised in this city in the early thirties of the last century.

The School of Design for Women was founded by the Franklin Institute in 1850, and has ever since maintained its reputation as one of the greatest of benefactions.



George Wallace Melville

George Wallace Melville was born in New York January 10, 1841; educated at the public schools and at the Brooklyn Polytechnic Institute; appointed to the U. S. Navy as Assistant Engineer July, 1861, and served with distinction through the civil war, and later at various U. S. Navy stations. In 1879 he sailed with DeLong in the Jeannette for the Arctic, and commanded the boat which escaped from the wilds of the Lena Delta. Subsequently he commanded the expedition which recovered the records of the Jeannette expedition and the remains of DeLong. He was awarded by Congress a gold medal, and advanced fifteen numbers for bravery in the Arctic. He was appointed in 1887 and re-appointed in 1892 and 1896 Engineer-in-Chief of the U. S. Navy, and was promoted to the grade of Rear Admiral in 1899. He retired in 1903. He was the designer of the triple screw machinery in the Columbia and the Minneapolis. He was President of the American Society of Mechanical Engineers.

The Pennsylvania Museum and School of Industrial Art, while called into existence by the great Centennial Exposition, was housed and fostered by the Franklin Institute in its early years.

The University Museum is the heir of the project of the Franklin Institute for an Art School in 1837, which failed of an appropriation by the Legislature, though the City Councils granted the plot of ground.

The Institute of Electrical Engineers is a direct result of the Electrical Exhibition of the Franklin Institute in 1884.

Some of the many institutions which have availed themselves of the experience and methods of the Franklin Institute in their organizations are: The Maryland Mechanics' Institute; the American Institute of New York; the Ohio Institute of Cincinnati; the San Francisco Institute; the Pratt Institute, of Brooklyn; the Lowell Institute, of Boston; the Armour Institute, of Chicago; and the Cooper Institute, of New York. These are only a few of the many which have adopted the lines of activity exploited and proven by the Franklin Institute.

An attempt has been made to ascertain the number of those who have profited by the instruction in the schools of the Franklin Institute. For the earlier years up to 1881 only approximations could be obtained, but from 1881 to 1908 the numbers given are from actual count:

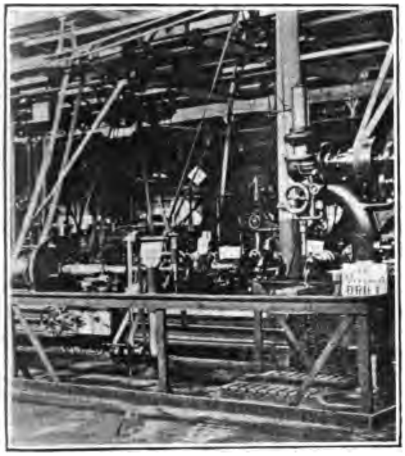
1824-1831	350
1831-1841	500
1841-1851	900
1851-1861	1000
1861-1871	1500
1871-1881	1680
1881-1890	3273
1890-1899	2615
1899-1908	2764
Total, 1824 to 1908 (84 years)	14,582

This means that an average of 173 men, both young and mature, have been annually helped on their journey to usefulness and self-support by this Institute. If you would know what places these products of our educational machinery have filled in the world, two names from the earlier years suggest themselves: Thomas U. Walter, a young bricklayer, who was one of the first to avail himself of the advantages of the instruction given here, became an architect of national reputation, and later Professor of Architecture in the Institute's faculty in 1842, enduring monuments of whose skill may be seen to-day in Girard College and the National Capitol at Washington. One of the most distinguished men who has ever filled the Presidential chair of the Institute, whose death we have lately been called upon to mourn, Dr. Coleman Sellers, received a part of his primary education within these walls.

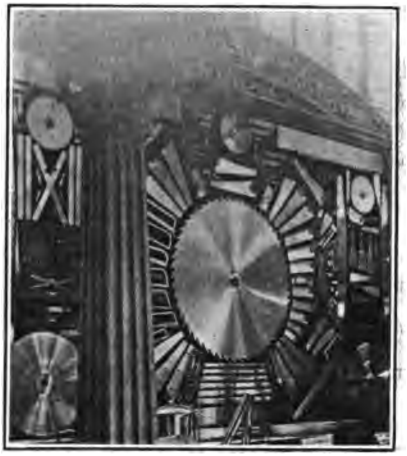
For the rest, a visit to any of the great work shops of the country will be likely to reveal one or more among the bosses or officers who thanks the schools of the Franklin Institute for his early training.

The Exhibitions of the Institute have been of the greatest value to the City, State, and Country, as witness the testimony of the Board of Managers in 1838, before quoted, where it is intimated the rapid progress of the Arts throughout the country between 1824 and that date was partly due to the ambition of manufacturers to surpass their rivals at the Franklin Institute's annual competitions. Within eight months of the foundation of the Franklin Institute a successful exhibition under its auspices was held in Carpenters' Hall.

The earliest exhibitions of this Institute (and certainly some of those in the fifties of the last century which your speaker remembers) were held in the Masonic Temple, in Chestnut Street above Seventh, on the north side. Dr. Wahl tells us in his interesting history written in 1894, that some intermediate exhibitions were given yearly or every other year at the Chinese Museum, Ninth and Sansom Streets, or until that structure was burned, in 1850. They were discontinued from 1858 till after the war, and the first great exhibition mentioned by the authority just quoted was in the year 1874, when the Pennsylvania Railroad had sold to John Wanamaker the site of his present enormous granite structure, then a freight depot. Through the foresight and activity of Messrs. Wm. P. Tatham and Charles H. Banes, this depot was secured for the exhibition. The great Central Sanitary Fair held in Logan Square ten years before, during the progress of the Civil War, which netted the army and navy hospitals over a million dollars, had opened the eyes of our people to the possibilities of a worthy exposition, and the Franklin Institute Exhibition of 1874 profited by the experience, indeed was aided by many



Franklin Institute exhibition of 1874
Bement & Dougherty



Franklin Institute exhibition of 1874
Disston's exhibit

Franklin Institute exhibition of 1874
Carriages

Franklin Institute exhibition of 1874
S. S. Pennsylvania (American Line)

who had made the Sanitary Fair a success. It ranks to-day as the most successful exhibition of its kind which was ever held, up to that time. As the result of a resolution of a meeting of the Franklin Institute in August, 1869, and addressed to the Councils of the City of Philadelphia, suggesting an exhibition of the whole people of the United States to commemorate the completion of the hundredth year of our independence, a great Centennial Exposition had been undertaken, preparations for it were well advanced and it was but two years off. The exhibition of 1874 by the Franklin Institute served as a practice canter to try the condition of the people of Philadelphia. The results of this effort were splendid for the community and for the Institute. Dr. Coleman Sellers, who made the address at the closing ceremonies, and Mr. Tatham, who made the report, have ably summed up the results, and a relic of our shout of triumph remains in an old lantern slide now thrown on the screen. This exhibition was a God-send to the Institute. From its $52,000 net profit of stored-up energy we have been drawing, in our moments of necessity, ever since, until there is very little kinetic force left.

Exhibition building, Franklin Institute, 1884

In 1884 the greatest electrical exhibition ever till that time held in the United States, was added as an additional diadem in the Institute's crown of glory. It was international in character, but like our great Centennial Exhibition to which alone among the general exhibitions called national or international ever held in this country, the Federal Government refused to contribute a dollar, it was obliged to seek its support from private contributions.

The result was that while it was a magnificent success, both from a scientific and a financial point of view, all the profits which would otherwise have justly benefitted the Institute were disbursed for the cost of equipments, buildings, and installations. A few thousand dollars remained after these expenses were paid.

The Novelties Exhibition which followed the next year was not a success from any point of view.

Among the chief services rendered to the nation, State and city by the Franklin Institute is that of furnishing through the unpaid labors and unswayed judgment of its Committee on Science and the Arts a rod of menace to the wrong-doer and a shield of protection to the government and citizen. Whenever the State or city administration has asked the Institute's aid in sifting a technical statement, or ascertaining whether a product was up to specifications, this information has been cheerfully, promptly and ably given, and with such authority that no appeal from the decision has ever yet been sought elsewhere. The Franklin Institute thus has contributed to the tax-payer a mighty private watchman of whom his enemies stand in awe.

Franklin Institute exhibition of 1885
Frozen fountain

Hardly less in value, though of a very different kind, is the aid which the Franklin Institute renders again through its great committee,—by the award of prizes to those who have really enriched their fellow beings by inventions and discoveries.

John Scott, of Edinburgh, by his will of date 1816 bequeathed $4000 to the corporation of the City of Philadelphia, directing the interest and dividend should be laid out in premiums to be distributed, each with a copper medal bearing the inscription "To the Most Deserving," to ingenious men and women who make useful inventions. The Councils of this City by ordinance of February 27, 1834, vested the duty of selection and award in the Franklin Institute. On the creation of a Board of Directors of City Trusts by the Legislature of Pennsylvania in 1869 this passed into their hands, and they by resolution in 1882, referred it to their subcommittee on Wills Hospital and Minor Trusts. This committee placed the selection again in the hands of the Franklin Institute for report to them, and the Franklin Institute delegated this duty to its Committee on Science and the Arts. No proposal of a candidate by this committee has ever been rejected by the Institute or by the Board of City Trusts.

Franklin Institute. Interior of library, 1874 to 1898

Elliott Cresson, of Philadelphia, February 18th, 1848, conveyed $1000 in securities to the Franklin Institute to pay for suitable dies and for the preparation of gold medals to be awarded by it to such persons as it may designate who have either made discoveries in the Arts and Sciences, or inventions or improvements of useful machines, or some new process or combination of materials in manufacture, or for ingenuity, skill, or perfection in workmanship. This award was also referred to the Committee on Science and the Arts, under the same conditions which govern its proposals for the John Scott legacy premiums.

March 23, 1859. Uriah A. Boyden deposited with the Franklin Institute the sum of $1000, to be awarded as a premium to any resident of North America who shall determine by experiment whether all rays of light and other physical rays are or are not transmitted with the same velocity. The problem was more specifically defined by the Board of Managers whether or not all rays in the spectrum known at the time the offer was made (March 23, 1859), *i. e.,* between the approximate frequencies of 2×10^{14} and 8×10^{14}, travel through free space with the same velocity. This prize was won by Dr. Paul R. Heyl, Professor of Physics in the Central High School of Philadelphia, and awarded to him by resolution of the Board of Managers of the Franklin Institute dated June 19, 1907.

Franklin Institute library book stack, 1898

In 1882, the Franklin Institute authorized the Committee on Science and the Arts to award certificates of merit to persons judged worthy by reason of inventions, discoveries, or productions.

In 1890, Edward Longstreth, machinist in the Baldwin Locomotive Works, transferred to the Franklin Institute securities of the value of $1000, the interest of which is to be expended for silver medals to be awarded by the Committee on Science and the Arts for the encouragement of invention and in recognition of meritorious work in Science and the Industrial Arts.

The honor of possessing these tokens of achievement without doubt has been a strong incentive to useful research, and the cause of many notable and useful discoveries and inventions.

The reports of the Franklin Institute's special committee on the economic utilization of water power; on the explosion of steam boilers; on the strength of materials; on the reforms desirable in our system of weights and measures; on the weather through a corps of trained observers (which led the way to the present national weather bureau); on uniformity of screw-threads (which was not only generally adopted by manufacturers and by the United States Government, but was practically copied by the German Empire in 1887, though adapted to the metric system); on the water supply of Philadelphia; on the efficiency of dynamo-electric machines for arc lighting in 1878; on the life, duration and efficiency of incandescent lamps in 1884 (the parts of which relating to the wiring of buildings have since been embodied in the regulations of the Fire Underwriters' Association). All these reports now belong to the classics of the subjects of which they treat and have added immensely to the influence of the Franklin Institute, and to the fame of our city.

Franklin Institute facade 1890

Without derogation to the work of our sisters, the American Philosophical Society (under whose auspices Rittenhouse did actually observe the transit of Venus in the 18th Century), and the Academy of Natural Sciences, whose contributions to the needs of humanity consist mainly in discoveries of hitherto unknown facts and laws of nature, regarding which our name-saint, Benjamin Franklin, when asked their value, pithily said, "What is the value of a newly-born babe?" none of them has compared with the Franklin Institute in gifts of immediate value to mankind; yet both have been aided by large donations from the National, State, or City governments, while the Franklin Institute has never received a cent except for value rendered.

DESERTS.

The list of services of the Institute might be extended very largely, but it is enough to establish the fact that men of the greatest eminence cöoperated at the inception, and during the early history of the Institute, in laying deep and broad the foundations of her usefulness—men who gave the labor of years unrecompensed except by the appreciation of people of the highest culture—chiefly outside of Philadelphia and Pennsylvania.

In justice to these men and their unselfish work the people of this State should not allow this unselfishness to diminish or the Institute's influence to decline.

It was recognized as long ago as the thirtieth decade of the last century that the building, then not twenty years old, and the location of the Institute, were inadequate to her needs.

The disastrous crash of 1837 fell with peculiar severity upon her, and her loss of money at that time has had a deterrent effect upon all efforts to better her position since. From time to time committees to solicit a building fund were appointed, and during the presidency of Mr. Joseph M. Wilson twenty odd thousand dollars were collected, paid and deposited to the credit of the Institute.

Finally a new hope arose that the fund laid aside by the great Philosopher-printer might be used to establish an institution which would have been dearer to his heart than any scheme of bringing Wissahickon water to the City Hall, or paving the streets.

In February, 1906, it was ascertained that although in the previous year the increased principal of the Franklin fund, less the £1000 set apart by the will, had been awarded by the Board of Wills Hospital and Minor Trusts to a body of citizens for the erection of an Art gallery, yet no steps had in the meantime been taken to erect such a gallery, and the conditions of the gift being unfulfilled the appropriation was null and void.

A committee was appointed to solicit contributions for a new building. Mr. Alfred C. Harrison was a member of this committee, and in addition to his generous acts in connection with this and many other charitable institutions, for which he will always be gratefully remembered by Philadelphians, he headed the list with a subscription of $50,000, to which the Baldwin Locomotive Works added $25,000.

In a short time $100,000 was subscribed.

The City of Boston had managed the like sum of £1000 which Franklin had left to its care so much more successfully than the City of Philadelphia that it had grown to $418,000 in contrast with $125,000 here. The City of Boston determined to apply it to the erection of such an institute as ours, and to this end donated a plot of ground worth $100,000. Mr. Andrew Carnegie, the greatest and wisest giver in all history, gave an amount equal to that derived from the Franklin bequest toward this end, making the fund $836,000, or with the City of Boston's contribution $936,000—close to a million dollars.

Proposed site and supposed view of the projected new Franklin Institute looking from City Hall

The Franklin Institute committee proposed to the Board of Trustees to transfer to the City of Philadelphia a plot of ground secured for the Franklin Institute at the corner of Sixteenth and Arch Streets, and to add the sum of $100,000 to be paid to the city on condition that the city would become Trustee of the Building Fund, holding the building when erected exclusively for the uses of the Franklin Institute; and further, that the city would add the Franklin fund of $125,000 to the Institute's contribution of $100,000 for the purpose of erecting the building. This offer was accepted April 16, 1907. While the ability of the Franklin

Institute to raise the necessary amount of money agreed upon was still in doubt, Mrs. Anna W. Walker generously and most opportunely gave the princely subscription of $50,000 in memory of her father, Mr. Weightman, thus clinching the proposition and assuring the Institute a new lease of life under greatly improved conditions.

The amount now in hand is as follows:

Franklin Fund, from the City of Philadelphia	$125,000
Old Building Fund	20,000
Subscriptions to date*	193,455
	$338,455
Add the value of the present building (say)	60,665
Total in round numbers	$400,000

Proposed new building of the Franklin Institute, 16th and Arch streets, Philadelphia

At least $200,000 more is needed to provide a suitable building as a memorial to Benjamin Franklin, and the (Benjamin) Franklin Institute, and an additional sum to furnish an endowment for maintenance.

The general plan is to erect a four-story building with high basement, which latter is to contain the laboratories and an exhibition hall, seating about 500 people. The second floor will contain the balcony of the auditorium and the committee rooms, Secretary's room, and a museum showing the developments of the arts. The fourth floor is for the library, in which it is proposed to use the combined alcove and stack system.

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*Now over $200,000.

If the building be erected at Sixteenth and Arch Streets the auditorium entrance will be on Sixteenth Street and the main entrance on the new Boulevard.

Ladies and Gentlemen, it is St. Valentine's night. You know St. Valentine was a Bishop and martyr put to death in Rome on February 14th, 270, by Claudius II. (or some say Aurelian) for opposing the Organization of his time.

The custom of choosing Valentines is very old. On St. Valentine's Eve (but evening will do as well) each person present put a slip of paper bearing his name into a box. Then each man drew a slip from the box containing the names of the women, and he was the true Valentine for a year of the lady whose name he drew.

Let us renew the custom, with the modifications which the eighteen centuries of advancing civilization suggest. Let each of you write his name on a slip of paper, preferably a bank cheque, with a good round sum written above it. And the Actuary will draw out of his book (which is the modern substitute for a box) a slip for each with the name of the Franklin Institute written on it in acknowledgment. So shall the Franklin Institute be the Valentine of you all for not only one, but for many a year; and so shall we preserve, with improvements, the custom handed down to us across the vast vista of centuries.

The Editors of the Journal feel called upon to supplement Dr. Frazer's notices of men whose work in connection with the Franklin Institute has most notably contributed to the extension of its activities by due reference to his own collaboration in that regard and to his life work generally.

Persifor Frazer, geologist and chemist, was born in Philadelphia, July 24, 1844. He was graduated from the University of Pennsylvania in 1862; was aide in U. S. Coast Survey and served in South Atlantic Squadron in 1862-3; volunteered with the Philadelphia City Troop in the Gettysburg Campaign in 1863, and thereafter served as acting ensign in the Navy until the close of the war, in 1865. He studied at the School of Mines, Freiberg, Saxony, 1868-69; was Mineralogist and Metallurgist in the U. S. Geological Survey 1869-70; Professor of Chemistry, University of Pennsylvania, 1870-4; assistant in the second Geological Survey of Pennsylvania, 1874-82, and was accorded the degree of Doctor in Natural Science by the University of France. He became Professor of Chemistry at the Franklin Institute, and an editor of its journal, 1882-1894, resuming since 1903; Professor of Chemistry at the Horticultural Society of Pennsylvania since 1889. Dr. Frazer is author of Tables for the Determination of Minerals; Bibliotics, or the Study of Documents; four volumes of the Reports of the Second Geological Survey of Pennsylvania; Life and Letters of E. D. Cope; Matriculate Catalogue of the University of Pennsylvania (in collaboration); and volumes I and II of "Descendants of Persifor Frazer;" also 300 papers and contributions published by scientific societies. He is a life member of the American Philosophical Society, Academy of Natural Sciences, Historical Society of Pennsylvania, American Institute of Mining Engineers (of which he is Vice-President); Pennsylvania Horticultural Society, British Association for the Advancement of Science, Sociedad Cientifica Antonio Alzate of

Persifor Frazer

Mexico, Société Géologique du Nord, France, Société Géologique de Belgique, Belgium, Military Order of the Loyal Legion of the United States Naval Veteran Association; Cincinnati Society in New Jersey; Pennsylvania Society of the Sons of the Revolution; member and Vice-President of the Society of the War of 1812; member of the Society of Colonial Wars in Pennsylvania, Society of American Authors; life fellow of the American Association for the Advancement of Science, and Geological Society of America. Officier de l'Instruction Publique, France; and correspondent der Reichsanstalt of Austria. He received from the City of Philadelphia on recommendation of the Franklin Institute, the John Scott Legacy Medal for a colorimeter in 1906. He is a member of the Board of Managers of the Franklin Institute.

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